

## CLAIMS

What is claimed is:

1. An encoder for encoding an input data signal comprising:
  - 5 an analysis filter bank to decorrelate an input data signal;
  - a plurality of decimators to down sample the filtered input data signal; and
  - a predictor to extract cross-subband dependence.
2. The encoder of claim 1, wherein the analysis filter bank includes a multi-level filter bank.
  - 10 3. The encoder of claim 2, wherein the input data signal is two-dimensional.
  4. The encoder of claim 3, wherein a predictor extracts higher frequency subbands that result from a first-level two-dimensional decomposition performed by the analysis filter bank from subbands obtained from higher levels of a two-dimensional decomposition performed by the analysis bank.
    - 15 5. The encoder of claim 4, wherein the two-dimensional decomposition is performed along one dimension first by processing the analysis filter bank as a separable transform.
    6. The encoder of claim 4, wherein full decimation is performed prior to a predictor that extracts cross-subband dependence.
      - 20 7. The encoder of claim 5, wherein full decimation is performed prior to a predictor that extracts cross-subband dependence.

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8. The encoder of claim 4, wherein full decimation is performed after a predictor to minimize spatial location variance introduced by decimation.
9. The encoder of claim 4, wherein partial decimation is performed after both the analysis filter and the predictor for reducing the number of computations by the analysis filter and decimation.  
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10. The encoder of claim 5, wherein full decimation is performed after the predictor to minimize spatial location variance introduced by the decimation.  
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11. The encoder of claim 5, wherein partial decimation is performed after both the analysis filter and the predictor for reducing the number of computations by the analysis filter and the decimation.

12. An encoder for encoding an input data signal comprising:
  - a multi-level analysis filter bank for decimating an input data signal;
  - a plurality of decimators for down sampling the filtered input data signal;
  - a predictor for extracting cross-subband dependence; and

5 wherein the second and higher-ordered levels of the filter bank are finite impulse response (FIR) filters with fewer elements than those in the first-level FIR filter bank.

  
- 13. The encoder of claim 12 , wherein a predictor extracts the higher-frequency 10 subbands resulting from a first-level two-dimensional decomposition performed by the analysis filter bank from higher frequency subbands obtained from higher levels of a two-dimensional decomposition performed by the analysis bank.
  
- 14. The encoder of claim 13, wherein the two-dimensional decomposition is 15 performed by processing the analysis bank as a separable transform.
  
- 15. The encoder of claim 13, wherein full decimation is performed prior to the predictor.
  
- 20 16. The encoder of claim 13, wherein full decimation is performed after the predictor for minimizing spatial location variance introduced by the decimation.
  
- 25 17. The encoder of claim 13, wherein partial decimation is performed after both the analysis filter and the predictor for reducing the number of computations by the analysis filter and decimation.
  
- 18. The encoder of claim 14, wherein full decimation is performed after the predictor for minimizing spatial location variance introduced by the decimation.

19. The encoder of claim 14, wherein partial decimation is performed after both the analysis filter and the predictor for reducing the number of computations by the analysis and the decimation.

20. An encoder for encoding an input data signal comprising:  
a multi-level analysis filter bank for decorrelating an input data signal;  
a plurality of decimators for down sampling the filtered input data signal;

and

5 a compressor including a quantizer and coder for reducing the amount of  
down sampled data from the second and higher levels of wavelet decomposition.

21. An encoder of claim 20, wherein the output of the compressor is  
transmitted to a receiver for decoding the compressed data signal.

22. A decoder for recovering a compressed received data signal comprising:  
a plurality of interpolators for upsampling a received compressed data  
signal;  
a multi-level synthesis filter bank for performing an inverse wavelet  
5 transformation filter bank; and  
a predictor for extracting cross-subband correlations.

23. A decoder for recovering a compressed data signal comprising:
  - a de-compressor including an inverse quantizer and inverse coder for expanding the reduced amount of received data;
  - 5 a plurality of interpolators for sampling compressed data signal;
  - a multi-level synthesis filter bank for performing an inverse wavelet transformation filter bank; and
  - a predictor for extracting cross-subband correlations.
24. The decoder in claim 23 further comprising a means for conveying the recovered data signal.  
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25. A decoder for recovering a compressed data signal comprising:  
a de-compressor including an inverse quantizer and inverse coder for  
expanding the reduced amount of received data;  
a plurality of interpolators for upsampling a compressed data signal;  
5 a multi-level synthesis filter bank for performing an inverse wavelet  
transformation filter bank; and  
a predictor for extracting higher-frequency subbands corresponding to the  
first-level decomposition of an analysis wavelet filter bank.

10 26. The decoder in claim 25 further comprising a means for conveying the  
recovered data signal.

27. A decoder for recovering a compressed received data signal comprising:
  - a plurality of full interpolators for upsampling a compressed data signal
  - prior synthesis filtering,
  - a multi-level synthesis filter bank for performing an inverse wavelet
  - transformation filter bank; and
  - a predictor to extract cross-subband correlations.

28. A decoder for recovering a compressed received data signal comprising:
  - a plurality of partial interpolators for partially upsampling a compressed data signal prior synthesis filtering,
  - a multi-level synthesis filter bank for performing an inverse wavelet transformation filter bank;
  - a predictor for extracting cross-subband correlations, and
  - a plurality of partial interpolators for partially upsampling the extracted data from the predictor.

29. A decoder for recovering a compressed data signal comprising:
  - a de-compressor including an inverse quantizer and inverse coder for expanding the reduced amount of received data;
  - a plurality of full interpolators for upsampling compressed data signal prior synthesis filtering,
  - a multi-level synthesis filter bank for performing an inverse wavelet transformation filter bank; and
  - a predictor for extracting cross-subband correlations.
- 10 30. The decoder in claim 29, wherein the predictor extracts higher frequency subbands corresponding to the first-level decomposition of an analysis wavelet filter bank.

31. A decoder for recovering a compressed data signal comprising:
  - a de-compressor including an inverse quantizer and inverse coder for expanding the reduced amount of received data;
  - a plurality of partial interpolators for partially upsampling a compressed data signal prior synthesis filtering;
  - a multi-level synthesis filter bank for performing an inverse wavelet transformation filter bank;
  - a predictor for extracting cross-subband correlations, and
  - a plurality of partial interpolators for partially upsampling the extracted data from the predictor.
32. The decoder in claim 31, wherein the predictor extracts higher frequency subbands corresponding to the first-level decomposition of an analysis wavelet filter bank.

33. An encoding - decoding system for processing data signals comprising:  
an encoder including:
  - a multi-level analysis filter band for decorrelating an input data signal;
  - 5 a plurality of decimators for down sampling a filtered input data signal;
  - a quantizer for processing only the subbands from the second and higher levels of wavelet decomposition;
  - 10 a coder for compressing the subbands from the second and higher levels of wavelet decomposition;
  - a decoder including:
    - 15 an inverse quantizer for decompressing received subbands;
    - an inverse coder for decompressing received subbands;
    - a plurality of interpolators for upsampling the received compressed data signal;
    - a multi-level synthesis filter bank for performing an inverse wavelet transformation filter bank; and
    - 20 a predictor for extracting the subbands from the first level decomposition that were not transmitted based on data of their spatially correlated subbands from other levels of decomposition.